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# **Expressing Business Rules: A Fact Based Approach**

A thesis presented in partial fulfilment of the  
requirements for the degree of

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Adrian John Hargreaves

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Department of I n f o r m a t i o n  
S y s t e m s

**CERTIFICATE OF REGULATORY COMPLIANCE**

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**Candidate's Name: Adrian Hargreaves**

**Signature:** 

**Date:** 3/12/04

**Supervisor's Name: Kevin Wilkinson**

**Signature:** 

**Date:** 3/12/04

## **ABSTRACT**

Numerous industry surveys have suggested that many IT projects still end in failure. Incomplete, ambiguous and inaccurate specifications are cited as a major causal factor. Traditional techniques for specifying data requirements often lack the expressiveness with which to model subtle but common features within organisations. As a consequence, categories of business rules that determine the structure and behaviour of organisations may not be captured until the latter stages of the systems development lifecycle.

A fact-based technique called Object Role Modelling (ORM) has been investigated as an alternative approach for specifying data requirements. The technique's ability to capture and represent a wide range of data requirements rigorously, but still in a form comprehensible to business people, could provide a powerful tool for analysts. In this report, ORM constructs have been synthesised with the concepts and definitions provided by the Business Rules Group (BRG), who have produced a detailed taxonomy of business rule categories. In doing so, business rules discovered in an organisation can be expressed in a form that is meaningful to both analysts and business people. Exploiting the expressive simplicity of a conceptual modelling technique to articulate an organisation's business rules could help to fill a significant requirements gap.

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# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND

An essential role performed by the systems analyst is that of communicator. Perhaps the most important facet of this role is conveying the perceptions they have formed concerning a business system to the domain expert. In order to confirm the accuracy and completeness of the analyst's understanding of a system and its information requirements, the domain expert must be able to challenge those perceptions.

Traditionally, analysts have relied on abstract models to capture the subtleties of business systems. Although these models are able to convey these details to other analysts, the domain expert is often less able to interpret the information they contain. But unless the content of these models is transparent to the domain expert, how are they to validate the perceptions of the analyst?

Many modelling tools and techniques also suffer from an inability to fully capture the data requirements of information systems. Although data structuring features such as sub-typing and generalisation can now be represented, the constraints that apply to these and other data structures are often weakly supported (ter Hofstede, Proper, & van der Weide, 1994). Where modelling approaches do consider such details, they are often expressed formally in the language of mathematics. Although formality adds rigour and precision to the data requirements captured, this approach is not likely to facilitate the involvement of domain experts in their validation.

In order to agree on what a business system currently does and what it actually should do, analysts require expressive modelling tools that capture requirements accurately and promote effective communication with domain experts. In the absence of such tools, one would expect such agreement to be difficult to reach.

## **1.2 SIGNIFICANCE**

It is generally agreed that the analysis phase of the systems development life-cycle (SDLC) is of crucial importance to the overall success of IT projects. This is understandable, as a major deliverable of the analysis phase is a definition of the requirements for a business system. Unless errors and omissions within this definition are detected early, they often feed into successive phases of the SDLC. Unfortunately, incomplete, ambiguous and inconsistent requirements are commonplace in industry and these inadequacies often have a significant impact on software quality (Bell & Thayer T.A., 1976; Meyer, 1985). This suggests that approaches for capturing and representing requirements need to be improved in order to address issues relating to quality.

The scope of this thesis is restricted to the investigation of an approach for improving the transparency and expressiveness in which the data requirements of business systems are represented. To achieve this goal, a single framework involving the synthesis of a data modelling technique and a conceptual model of business rules will be developed. An expressive conceptual data modelling technique, known as Object Role Modelling (ORM), is used to represent categories of business rules as defined by

the Business Rules Group (BRG). The BRG have attempted to formalise an approach allowing business rules to be identified that define structural and behavioural properties of business organisations. Since ORM is able to verbalise assertions concerning business systems within a restrictive natural language, domain experts should be able to actively participate in the validation of business rules expressed in that language. By adopting this technique to articulate and define the data requirements of business systems, analysts may have an approach for improving the completeness, accuracy and quality of those requirements.

### **1.3 RESEARCH PROBLEM**

The main focus of this thesis is to develop a conceptual framework for the articulation of business rules that define the data requirements of business systems. The aim is to provide an approach that allows analysts to work in close collaboration with domain experts in the definition of those requirements, thereby promoting an effective strategy for their validation.

Thus the problem to be resolved by this researcher is to determine whether ORM constructs can be used to articulate business rules in a form that domain experts can actively challenge.

The intention of this research is to address this problem in the following manner:

- Conduct a literature review that examines the problems relating to the definition of data requirements and approaches for resolving those problems.

- Synthesise ORM constructs with the business rules concepts and definitions formulated by the BRG, into a single conceptual framework for describing the structure and behaviour of business systems.
- Apply the synthesised conceptual framework within a New Zealand commercial organisation to define the data requirements for a new business system.

## 1.4 RESEARCH PROCESS

The steps of the above research process and the chapters of this thesis that relate to these steps are documented below.

- Step 1.** An investigation into the problems relating the specification of system requirements and the approaches adopted to resolve these difficulties.

**Chapter 2 – Literature Review.**

- Step 2.** Investigate and select research methods and describe how they were applied within this thesis.

**Chapter 3 – Research Methods Selection.**

**Chapter 4 – Research Design.**

- Step 3.** Develop a conceptual framework for the articulation of business rules.

**Chapter 5 – Articulating Business Rules.**



**Step 4.** Applying the framework within a commercial organisation in order to assess its efficacy.

**Chapter 6 – Analysis of Findings**

**Step 5.** Analyse the findings drawn from the application of the framework.

**Chapter 6 – Analysis of Findings**

**Chapter 7 - Conclusions**

## **1.5 THESIS STRUCTURE**

The structure and relationship between the chapters within this thesis are described below.

### **Chapter 1: Introduction**

The first chapter describes the significance and background of the research conducted, together with a discussion on the research problem and how it was investigated.

### **Chapter 2: Literature Review**

The review of literature investigates previous research on the problems relating to the specification of system requirements and the approaches that have been developed in an attempt to resolve these difficulties. The chapter introduces conceptual modelling approaches, including ORM and the BRG's business rules model, and suggests that these approaches may be synthesised into a single framework to express the data requirements of business systems.

### **Chapter 3: Research Method Selection**

Based on the conclusions of the literature review, the chapter investigates methods of research available to researchers with a view of selecting appropriate approaches for undertaking this thesis.

### **Chapter 4: Research Design**

A detail account is provided on how the selected research methods were applied within a commercial environment to demonstrate the efficacy of expressing business rules using ORM constructs.

### **Chapter 5: Articulating Business Rules**

The theoretical issues relating to this thesis are explored in this chapter. It is demonstrated that ORM has the ability to express all categories of business rules as defined by the BRG.

### **Chapter 6: Analysis of Findings**

Having developed a single conceptual framework for the expression of business rules in chapter 5, its validity and efficacy are explored by applying the framework to define the data requirements of a new sub-system within a commercial organisation. The experiences of the researcher and domain experts in the application of this framework and the problems encountered are discussed in detail.

## **Chapter 7: Conclusions**

A summary of the findings are presented and their relevance to the research problem stated in chapter 1 is discussed. Future research suggested by the undertaking of this study is also described.

## **Bibliography**

Within this section, the references used throughout this thesis have been listed.

## **Appendices**

The documentation and data models produced during the two case studies and action research component of the thesis have been included within the appendices, together the BRG's business rule model.